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CLAIMS

[Claim(s)]

[Claim 1] The ink jet dyeing automatic embroidery approach characterized by carrying out automatic embroidery using a dyed needle thread, moving a base fabric according to embroidery pattern information while creating needle-thread dyeing data based on embroidery pattern information and yarn feed-per-revolution detection information and carrying out ink jet dyeing of the needle thread according to dyeing data.

[Claim 2] It has the yarn feed-per-revolution operation part which calculates a yarn feed per revolution from the rotation detecting element which detects the rotation of the body of revolution supported pivotable while the yarn feed-per-revolution detection means contacted the needle thread, and a rotation. While setting up the zero of a yarn feed per revolution on the needle thread which is in the ink jet dyeing section at the time of automatic embroidery initiation At the time of automatic embroidery initiation, the excessive needle thread from the needle point to the zero of a yarn feed per revolution The ink jet dyeing automatic embroidery approach given in the 1st term of a claim characterized by creating temporary embroidery pattern information according to an embroidery pattern, and carrying out temporary embroidery on a base fabric so that the embroidery starting position on a base fabric and the yarn feed-per-revolution zero of a needle thread may be in agreement.

[Claim 3] The 1st term of a claim characterized by performing amendment of stitch balancing thread tension and dyeing data according to an embroidery property while presuming a base fabric and the embroidery property of a needle thread based on the yarn feed per revolution at the time of temporary embroidery, or the ink jet dyeing automatic embroidery approach given in the 2nd term.

[Claim 4] The ink jet dyeing automatic embroidery approach given in one of the 1st term of a claim thru/or the 3rd term characterized by having constituted the diameter of an ink jet drop from a needle thread small, and considering the same part of a needle thread as the configuration which can be dyed by two or more ink jet drops.

[Claim 5] The device in which the needle thread embroidered is conveyed, and a means to detect the yarn feed per revolution of this needle thread, A means to perform on-demand mold ink jet dyeing before embroidering this needle thread, While carrying out ink jet dyeing of the needle thread according to a means to create needle-thread dyeing data based on the means which carries out after treatment of the dyed needle thread, and embroidery pattern information and yarn feed-per-revolution detection information, and these dyeing data Ink jet dyeing automatic embroidery equipment characterized by carrying out automatic embroidery using the dyed needle thread by which after treatment was carried out, moving a base fabric according to embroidery pattern information.

[Claim 6] The device in which the needle thread embroidered is conveyed, and a means to detect the yarn feed per revolution of this needle thread, A means to perform on-demand mold ink jet dyeing which is smaller than the size of a needle thread before embroidering this needle thread, or carries out the regurgitation of 1/2 or less and the ink droplet 75 micrometers or less of a yarn diameter, While carrying out ink jet dyeing of the needle thread according to a means to create needle-thread dyeing data based on embroidery pattern information and yarn feed-per-revolution detection information, and these

dyeing data Ink jet dyeing automatic embroidery equipment characterized by carrying out automatic embroidery using a dyed needle thread, moving a base fabric according to embroidery pattern information.

[Claim 7] The above-mentioned ink jet dyeing automatic embroidery equipment is the above-mentioned ink jet dyeing automatic embroidery given in the 5th term of a claim or the 6th term equipped with a means to change the number of ink droplets according to the size of yarn.

[Claim 8] The above-mentioned ink jet dyeing automatic embroidery equipment is a day which carries out color display of the above-mentioned embroidery pattern. Ink jet dyeing automatic embroidery equipment given in one of the 5th term of a claim thru/or the 7th term which has a spray and a color specification means to change the color information by which memory is carried out, and forms the above-mentioned embroidery pattern for the changed color information.

[Claim 9] The above-mentioned ink jet dyeing means is ink jet dyeing automatic embroidery equipment given in one of the 5th term of a claim thru/or the 8th term which equips the feed direction of yarn with two or more two or more nozzles from which a color differs in the feed direction of yarn.

[Claim 10] The above-mentioned ink jet dyeing means is ink jet dyeing automatic embroidery equipment given in one of the 5th term of a claim thru/or the 9th term which equips the feed direction of yarn with two or more nozzles from which discharge quantity differs.

[Claim 11] The above-mentioned ink jet dyeing means is ink jet dyeing automatic embroidery equipment given in one of the 5th term of a claim thru/or the 10th term which is leaning the array direction of a delivery a little to the feed direction of yarn.

[Claim 12] Ink jet dyeing automatic embroidery equipment given in one of the 5th term of a claim thru/or the 10th term equipped with a means to change the expulsion-of-an-ink-droplet rate of an ink jet dyeing means according to the dyeing pattern (concentration change of details, or two or more color mixture rate) of yarn in addition to the above-mentioned embroidery pattern.

[Claim 13] Ink jet dyeing automatic embroidery equipment given in one of the 5th term of a claim thru/or the 12th term equipped with the means which carries out optimal setting out of the dyed thread die length and the number of ink jet drops according to stitch balancing thread tension, cloth thickness, and an embroidery thread size.

[Claim 14] Ink jet dyeing automatic embroidery equipment given in one of the 5th term of a claim thru/or the 13th term which has the means which winds the point of yarn rapidly and carries out temporary embroidery of the achromatic section of the above-mentioned needle thread at an embroidery pattern outside.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] About the automatic embroidery approach and the equipment which have the automatic embroidery function perform automatic embroidery on a base fabric based on embroidery pattern information, this invention is specifically a sewing machine, and it relates to the ink jet automatic embroidery approach and the equipment which perform automatic embroidery, performing ink-jet dyeing for a needle thread suitably according to the color information which accompanies an embroidery pattern.

[0002]

[Description of the Prior Art] Although the sewing machine for home use which has business-use automatic embroidery equipment and a business-use automatic embroidery function is already produced commercially and it has spread It is necessary to embroider in piles for every color one by one, creating embroidery pattern information to love and exchanging a needle thread, in exchanging the needle thread for embroidery according to an assignment color and embroidering two or more colors with those conventional equipments. When carrying out automatic embroidery of the multicolor embroidery pattern, great time amount and a great effort were needed. Moreover, if it is necessary to prepare the needle thread for embroidery of various colors and says to reverse, the assignment of an embroidery color of the embroidery of the detailed color tone of limited **** is impossible for a actual top to the color number of the needle thread for embroidery. For example, it had to embroider having prepared the needle thread for embroidery according to the number of color tones, and carrying out sequential exchange of the needle thread, even if it was going to perform embroidery using the continuous color tone change (gradation) from deep green to yellow, and the power of expression of embroidery was restrained.

[0003] the textile-printing equipment using an ink jet technique puts in practical use in recent years -- having -- high -- a brilliance print -- although the ground has come to be produced at a simple process, the goodness of embroidery is difficultly improved by the expression with a cubic effect like embroidery. Moreover, it is what passed along the printing roll by the time there is a technique called warp textile printing as a yarn textile-printing technique conventionally, warp came out of **** and it passed along heddle. Understand it as what is gradually printed with the same speed as warp being woven in and going, it is called **, and the yarn first dyed the ground color is used as warp. After it drives cotton yarn into this as the woof and it carries out temporary textile to it at least at intervals of 15cm, there are two typical methods of weaving in the woof of acting before the audience and dying keeping understanding the woof which wound around **** again after removing and printing from the weaving machine, and was driven in at the time of temporary weave. The method of performing warp before finishing weaving as an example of this yarn textile-printing technique not using a printing roll but using an ink jet technique is indicated by JP,59-42093,B, and improvement in power of expression of textile printing of it is enabled. In order to acquire a pattern that it aligned with weaving and coincidence with the textile construction, when the diameter of a nozzle controls the amount or the flight

direction of dye liquor which is made to spout dye liquor according to a pressure operation, an electric-field operation, etc., and is spouted according to the signal (specifically vertical actuation of yarn) which aligned with the textile organization from the dye-liquor blowout nozzle which has the aperture which is 80 micrometers by the above-mentioned official report, warp textile printing is carrying out at weaving and coincidence. For this reason, the ink droplet breathed out actually is set to 150 micrometers or more, is larger than the size of usual yarn, and cannot attain dyeing of a desired precision as a result because of overflow of an ink droplet, or a blot. And since dyeing of ink is changed according to vertical actuation of yarn, precision will fall that the attainment situation of an ink droplet tends to be influenced by fluctuation of yarn. Moreover, since the textiles cloth-ized with this official report are further performed with cloth in after treatment, they cannot prevent deterioration.

[0004] And it does not use widely [in order that the configuration of the above-mentioned official report may weave in a complicated pattern, it is difficult to become complicated / the ink jet equipment for controlling the amount or the flight direction of dye liquor /, and large-sized, and to incorporate also with large-sized equipment like weaving equipment, and] from being inferior to the above-mentioned ink jet textile-printing approach of printing a pattern free [in respect of power of expression] with ink jet equipment on cloth.

[0005]

[Problem(s) to be Solved by the Invention] The object of this invention is to offer the ink jet dyeing automatic embroidery approach that the desired amount of dye liquor or a desired dyeing pattern can be obtained easily, with comparatively small equipment.

[0006] after other objects of this invention applied the ink jet technique and employing the three-dimensional power of expression of embroidery efficiently -- high -- a brilliance color expression is excelled in operability, and it aims at offer of the ink jet automatic embroidery equipment of a simple configuration.

[0007]

[The means and operation] which solve a technical problem While according to this invention creating needle-thread dyeing data based on embroidery pattern information and yarn feed-per-revolution detection information and carrying out ink jet dyeing of the needle thread according to dyeing data Moving a base fabric according to embroidery pattern information, and it carries out automatic embroidery and depends. In detail [ink jet dyeing automatic embroidery] It constitutes from a rotation detecting element which detects the rotation of the body of revolution supported pivotable while contacting the needle thread in the yarn feed-per-revolution detection means, and yarn feed-per-revolution operation part which calculates a yarn feed per revolution from a rotation. While setting up the zero of a yarn feed per revolution on the needle thread which is in the ink jet dyeing section at the time of automatic embroidery initiation According to embroidery pattern information, create temporary embroidery pattern information, and carry out temporary embroidery on a base fabric so that the embroidery starting position on a base fabric and the yarn feed-per-revolution zero of a needle thread may be in agreement in the excessive needle thread from the needle point to the zero of a yarn feed per revolution at the time of automatic embroidery initiation. While presuming the embroidery property of a base fabric based on the yarn feed per revolution at the time of temporary embroidery, according to an embroidery property, amendment of stitch balancing thread tension and dyeing data is performed. Or further By constituting the diameter of an ink jet drop from a needle thread small, and considering the same part of a needle thread as the configuration which can be dyed by two or more ink jet drops after applying the ink jet technique and employing the three-dimensional power of expression of embroidery efficiently -- high -- it became possible to excel a brilliance color expression in operability and an embroidery rate as fundamentally unnecessary in a needle-thread change, and to offer the ink jet dyeing automatic embroidery equipment of a simple configuration.

[0008]

[Example]

(The 1st example) The main configurations of the ink jet dyeing section of a needle thread in the ink jet dyeing automatic embroidery equipment of the 1st example of this invention and the embroidery section

are shown in drawing 1 . If dyeing / embroidery process of the needle thread in the ink jet dyeing automatic embroidery equipment of this example is explained simple After going around the spool with a rotary encoder which is the yarn feed-per-revolution detecting-element material for detecting the feed per revolution of a needle thread and setting [location / dyeing] up first, the needle thread for embroidery currently wound around the needle-thread bobbin supported by the needle-thread bobbin receptacle pivotable After the pretreatment liquid which is sent out to the pretreatment section of ink jet dyeing, bleeds, and consists of inhibitors etc. is applied uniformly, it is sent to the ink jet dyeing section. According to the dyeing data created based on embroidery pattern information and yarn feed-per-revolution detection information in the ink jet dyeing section, it is made to synchronize with migration of a needle thread, the ink jet drop of each number of color specification is driven in with ink jet dyeing equipment, and a needle thread is dyed. Automatic embroidery of the dyed needle thread is carried out by the embroidery needle, the bobbin thread, and base fabric free migration equipment which sends out heating, steam processing, etc. at the needle point of an embroidery-after carrier beam needle in the after-treatment section which performs fixation and coloring of a stain solution as a process after ink jet dyeing, and is driven according to embroidery pattern information.

[0009] Since the same configuration as conventional automatic embroidery equipment can apply fundamentally the process which carries out automatic embroidery using a predetermined needle thread based on the embroidery pattern information set up beforehand, the detailed configuration of the automatic embroidery section and detailed explanation of operation are omitted, and are explained to a detail about a part of automatic embroidery section relevant to the automatic dyeing process of a needle thread and it by which it is characterized [of this invention] .

[0010] Although automatic embroidery is performed with the ink jet dyeing automatic embroidery equipment of this invention, performing ink jet dyeing of a needle thread based on embroidery pattern information, in that case, it is required to set up which part of a needle thread is dyed how. Moreover, since the needle thread from the needle point which starts embroidery actually to the ink jet dyeing section needs to pass each process by the time it starts automatic embroidery, it needs special processing of dyeing beforehand. Then, the zero of a yarn feed per revolution is set up on the needle thread which is in a needle-thread bobbin side by this example rather than the ink jet dyeing section which includes the pretreatment section at the time of automatic embroidery initiation, the needle thread of a needle drawer back is set up as a garbage from a needle-thread zero, temporary embroidery is once performed on a base fabric, and it is considering as the configuration which understands and removes the excessive needle thread by which temporary embroidery was carried out after the completion of automatic embroidery. When the head section of the needle thread by which ink jet dyeing was lapped and carried out on it and a base fabric, judging from embroidery pattern information reaches the needle point, he is trying for the location which performs temporary embroidery to create a temporary embroidery pattern to the appearance by which a base fabric is set to the embroidery initiation section on a base fabric.

[0011] In this example, as shown in drawing 2 , the embroidery starting position and temporary embroidery starting position on a base fabric are set up identically. Drawing 2 (A) has set the temporary embroidery pattern as the appearance to which the die length of the needle thread which is needed for the temporary embroidery which performs temporary embroidery in the location which does not lap with an embroidery pattern from a temporary embroidery starting position, and reaches a temporary embroidery starting position, i.e., an embroidery starting position, again, and the die length of the needle thread from a needle-thread zero to the needle point become equal. In that case, temporary embroidery is performed the die length of a needle thread which is needed in order [, such as construction material, thickness, etc. of a base fabric, and construction material, a size of a needle thread,] to reproduce an embroidery pattern therefore differing, or presuming embroidery properties, like the stitch balancing thread tension (optimal tension) of a needle thread differs, and it may be made to perform resetting of a needle-thread zero, dyeing data, and a temporary embroidery pattern according to an embroidery property. Since automatic amendment of this dyeing data can be carried out also at the time of actual automatic embroidery, and it is possible to store on a base fabric at the part of the needle thread which does not appear as an embroidery pattern even if the amendment error (delay) of the some for the needle

thread of a needle point arises from the ink jet dyeing section, it is satisfactory practically. Moreover, a number of amendment data about embroidery properties, such as construction material and thickness of a base fabric, and construction material, a size of a needle thread, are created beforehand, and as a user sets up respectively, he may enable it to amend an embroidery property.

[0012] Moreover, drawing 2 (B) is the modification of temporary embroidery, when the embroidery area of an embroidery pattern is larger enough than temporary embroidery area, setting up a temporary embroidery pattern so that temporary embroidery may be embedded on the substrate of an embroidery pattern may constitute so that it may be selectable, and clearance of the needle thread by which temporary embroidery was carried out in that case becomes unnecessary.

[0013] It dyes based on yarn feed-per-revolution detection information, pulling out a needle thread from a needle point manually as a modification of this example, after setting a needle thread, and after setting up manually so that the head of the dyed needle-thread section may come to the hole location of the needle point, you may make it start automatic embroidery. However, since a constraint is in the processing time in each processes, such as processing liquid spreading, ink jet dyeing, and heating, in each of dyeing pretreatment / dyeing processing / dyeing after treatment of a needle thread, the manual setting of the needle thread in a predetermined yarn drawer rate is required of this example. In that case, a brake mechanism is prepared in the send of a needle thread, it sends out based on yarn feed-per-revolution detection information, and you may make it store a rate in the predetermined range.

[0014] Moreover, also when there is not a pattern with continuous embroidery pattern information but an isolated part, ink jet dyeing automatic embroidery that it can respond and continuous can be realized by using the technique of the temporary embroidery which gave [above-mentioned] explanation, without resetting a needle thread. In that case, even if easy in the clearance of a needle thread by which used the function together with well-known automatic yarn, and temporary embroidery was carried out with automatic embroidery equipment, it is good.

[0015] As pretreatment of ink jet dyeing, by this example, in order to make general-purpose yarn usable, the pretreatment function of a needle thread is prepared. If the embroidery needle thread only for ink jet dyeing automatic embroidery equipment is specified and it pretreats beforehand to the needle thread of dedication, it is also possible to consider as the configuration which skipped this process in ink jet dyeing automatic embroidery equipment. Pretreatment of ink jet dyeing in this example mainly bleeds, and is carried out for the purpose of prevention. The cloth processing liquid used with ink jet textile-printing equipment as pretreatment liquid is applicable. Although not illustrated in this example, after applying cloth processing liquid, the squeezing roller has removed excessive pretreatment liquid.

[0016] The configuration of the ink jet dyeing section is shown in drawing 3 . In this example, the ink jet head which carries out the regurgitation of the stain solution of four colors of BK-C-M-Y along the travelling direction of a needle thread and which is eight nozzles at a time respectively is prepared. When the discharge quantity of the stain solution breathed out from each nozzle is set up smaller than the diameter of a needle thread and is converted into a real ball by this example, it is about 40 micrometers in stain solution diameter. Although it is desirable to set up smaller than the diameter of field doubling which performs ink jet dyeing as for the diameter of a stain solution, since it spreads in about about 2 times in an instant when the breathed-out stain solution reaches yarn, what is necessary is just 1/2 or less [of the yarn used more preferably]. Since the needle thread used by this example is the diameter of about 120 micrometers when it sends out with predetermined stitch balancing thread tension (tension), although based also on dyeing concentration to the same part of yarn, the stain solution of each color plurality is constituted in the appearance made to reach the target. Timing is made to take and breathe out, when making cyanogen 4 drop and yellow 4 drop reach the location of eye X pixel from the zero of a ***** bee and the amount of sends of a needle thread, dyeing it Green and eye X pixel of a needle thread counters the location of eight nozzles of C1, C3, C5, C7, Y1, Y3, Y5, and Y7. Since an impact location shifts in the relation between a nozzle, the distance of a needle thread, the send rate of a needle thread, and the regurgitation rate of a stain solution, the regurgitation is performed to the timing which amended the amount of gaps actually. Therefore, in this example, the impact sequence of a stain solution serves as order of C1, C3, C5, C7, Y1, Y3, Y5, and Y7. The stain solution of the same color is

controlled by this example to set up an activity nozzle so that impact spacing may be extended in consideration of stain solution osmosis in a low-concentration (when there are few dyeing drops) yarn core part, although he is trying to make the same pixel reach the target up to each color a maximum of 8 drop. For example, when making cyanogen reach the target by four or less drops, he is trying to use an even number nozzle one by one using an odd number nozzle in the case of beyond it. Moreover, in order to make the operating frequency for every nozzle equalize, when using from the case where it uses from an even number nozzle, and an odd number nozzle, its ascending order and descending order are further changed for every pixel. A random-number circuit may be used so that random assignment of the assignment of an activity nozzle may be carried out and it may be carried out as the technique of operating frequency equalization of a nozzle.

[0017] Since nozzle spacing of the ink jet head used by this example is the one apparatus head of 564-micrometer 4 color a total of 32 nozzles between 70 micrometer colors of each color private contract and the maximum drive frequency of a dyeing pixel consistency is 6.12kHz in an equivalent for 360dpi, the maximum yarn feed rates are about 432 mm/sec. Therefore, although based on a seam pitch, a base fabric feed rate, cloth thickness, construction material, etc., the about [- seam pitch 5mm] thing fully corresponded to the rate of automatic embroidery is possible by sewing rate 1800 time stitch/, and the rate of automatic embroidery is not restricted by the dyeing rate of the ink jet dyeing section. Furthermore, what is necessary is to double the number of nozzles of each color of this example, for example, and just to make it use an odd number nozzle and an even number nozzle alternately with a pixel, although various approaches are possible in order to enlarge the rate (the maximum yarn feed rate) of ink jet dyeing.

[0018] Drawing 4 shows the modification of the above-mentioned ink jet head configuration which can be shade changed. (A) is the exploded view of the configuration of a shade head, and (B) is the enlarged drawing of the common liquid room. the ink receptacle which 600 is made to correspond to the ink room which had four filters 700 compartmented, and it has -- it's covering [like] and the uniting [with the heater board 100 / the orifice plate 1300 for nozzle, delivery, and common ink room formation]-through spring 500 of configuration as shown in drawing top plate 1500 is pressed. It can be understood that the detail of this configuration refers to the ink jet recording head of BJ method by Canon, Inc. marketed. A configuration new at drawing 4 is an ink room configuration shown in (B), and high dyeing of gradation nature can be enabled by replacing each nozzle of Y, M, C, and Bk shown by drawing 3 in the same color ink in which concentration differs. Each ink rooms 10a, 10b, 10c, and 10d are divided with Walls 30a, 30b, and 30c, respectively, and the ink of different concentration is received from the ink receiving parts 20a, 20b, 20c, and 20d. In this case, although color record becomes impossible, if an ink room is increased, not only color record but also gradation record of each color depends, and it can attain to altitude.

[0019] The example when the needle thread for embroidery is more remarkable than a dyeing drop and large as a configuration modification of the ink jet dyeing section was shown in drawing 6 . In drawing 6 , it is made to perform dyeing from both sides using two ink jet heads which counter to a needle thread. Drawing 7 is the example constituted without making two ink jet heads counter thoroughly, and he is trying not to be equivalent to the face side of a head where ink Myst generated at the time of the regurgitation of a stain solution counters.

[0020] Drawing 8 is constituted by the appearance in which the absorption member which is the explanatory view of the maintenance device of the recording head in this example, and is the auxiliary discharge appearance receptacle which is made to breathe out a stain solution and is recovered at the wiping member which wipes off foreign matters, such as protection / attraction cap used between a needle thread and a recording head at the time of un-using it and attraction recovery, and ink Myst, waste thread adhering to a face side, and the time of achromatic is inserted if needed.

[0021] The needle thread dyed in the ink jet dyeing section is made to heat-treat as after treatment of dyeing in this example. You may carry out it being also possible to omit this after treatment depending on the property of pretreatment liquid and a stain solution, for example, heat-treating with an iron etc. after automatic embroidery etc.

[0022] Control-block drawing of the ink jet dyeing automatic embroidery equipment of this example is shown in drawing 5. The dyeing data which consist of the dyeing location and dyeing conditions (the color and the number of dyeing drops) of a needle thread like the above-mentioned by drawing 5 based on the embroidery pattern information that it was inputted from the embroidery pattern data entry unit are created, and ink jet dyeing automatic embroidery is performed, amending dyeing data one by one from the yarn feed per revolution according to the embroidery condition at the time of temporary embroidery and embroidery. Embroidery pattern information may be chosen from the pattern beforehand built in storage, such as ROM of automatic embroidery equipment.

[0023] Here, the configuration of drawing 5 is explained briefly. An assignment means 2 to specify [from] the embroidery pattern which 1 is the control panel which the user of equipment operates, and is saved in equipment at the embroidery pattern memory means 6, such as a floppy and random access memory, while being displayed on the display which is not illustrated [a code or], It has a cloth type assignment means 3 to specify cloth types embroidered, such as thickness of cloth, and construction material, and the color specification means 4 convertible into the color of a request of the part or all the predetermined colors of an embroidery pattern. 5 is the amendment means of the foldout conditions of embroidery, and an activity eye-thread color amends whether the amount of clinches as ** cost of how much is needed using the information from the cloth type assignment means 3 and the color specification means 4. This information is sent to the dyeing data means forming 12 as condition amendment through CPU7. The thing and this example from which this ** cost serves as a count of a clinch by that pattern and the amount of amendments with the substantial product of the variation of the thickness of cloth in addition to the amount of the needle thread by which the yarn of that color according to a pattern is equivalent to a part for the substantial surface area of a pattern are set up.

[0024] 10 is a data-processing means to disassemble the embroidery pattern which includes color information in consideration of the color specification means 4 (it becomes unnecessary information when there is no modification) according to the specified embroidery pattern into the color corresponding to the ink color with which an ink jet dyeing unit is equipped, and a pattern. This example is changed into four colors of Y, M, C, and Bk, and the translation data processed with the data-processing means 10 is temporarily stored in each pattern memory 11 classified by ink. 19 is the yarn feed-per-revolution detection means mentioned above, distinguishes to accuracy the feed per revolution of the yarn supplied from the needle-thread feed zone 20, and sends the output to the dyeing data means forming 12. The amendment from the above-mentioned condition amendment means is taken into consideration for the information on the pattern memory 11 classified by ink, data formation of the data according to final color for dyeing is carried out based on yarn feed-per-revolution detection information, and, in response, as for the dyeing data means forming 12, Y, M, C, and the Bk head driver 13 drive the on-demand mold (BJ method) ink jet dyeing unit 14 in consideration of timing amendment of the amount of delay by the arrangement for every color of a head.

[0025] Although any of a configuration of having mentioned above are sufficient as the configuration of the ink jet dyeing unit 14, the pretreatment section 15 which performs well-known pretreatment for raising dyeing of non-chromonemata is formed just before this unit. Of course, since the way of non-chromonemata being needle threads to which this well-known pretreatment was performed beforehand can simplify an equipment configuration, it is desirable. It is the well-known after-treatment section, and by this example, 16 is moisture, recovery, etc. which were generated in the dyeing unit 14, it draws the liquid absorption member (water may be retained periodically) 17 which absorbs the ink discharged from the dyeing unit 14, and is performing after treatment by the elevated-temperature steam with the heating means 18. This uses the moisture of a liquid for a tail end process efficiently while improving the liquid absorptance of the liquid absorption member in the dyeing unit 14. Since this example is a configuration dyed a needle thread, since it is very minute compared with cloth textile printing, the area processed to unit time amount is efficient with such a configuration, and sufficient effectiveness is acquired with a small processor. Therefore, the yarn which passed this after-treatment section 16 is supplied to the sewing-machine device 9 as yarn [finishing / pattern dyeing], and is sewn with cloth migration according to the information on the color specified by the body driver 8 of a sewing machine,

and pattern memory, needle migration is performed relatively, and cloth [finishing / embroidery] is manufactured.

[0026] 21 may be the information which shows the zero of the dyeing initiation mentioned above, and may be the judgment information on which location before a tail end process. In addition, the zero information 21 is used as change timing to this embroidery from temporary embroidery mentioned above.

[0027] Like, even if it did not exchange needle threads, various color tones could be easily embroidered with the thing which were explained above and which was carried out to Mr. automatic embroidery ****, carrying out ink jet dyeing of the needle thread for embroidery according to an embroidery pattern.

[0028] (The 2nd example) Drawing 9 is a block diagram of the ink jet dyeing section used for the ink jet dyeing automatic embroidery equipment of the 2nd example of this example. In this example, it is the example which changes and dyes the number of the ink jet nozzles used according to the needle-thread size specified with the control panel so that optimal dyeing can be performed according to the size of the needle thread for embroidery. The automatic judging of the assignment of the size of a needle thread may be carried out with size detection means, such as a photo sensor which also prepared panel assignment on the yarn delivery path. Since it is a side (this example under) with a yarn guide member, if the size of yarn becomes large, he is trying for the criteria of a needle thread to add an upside nozzle suitably by drawing 9 in addition to a lower nozzle.

[0029] Drawing 10 is the modification of this example, and even if it is the physical relationship which a yarn guide and an ink jet head counter and the size of a needle thread became large, after the core of a needle thread considers as the configuration which does not shift from the core of an ink jet head, it shows the example which made the nozzle consistency of a core higher than a periphery.

[0030] By this example, even if the size of the needle thread for embroidery changes, optimal ink jet dyeing can be performed to the appearance explained above.

[0031] (The 3rd example) Although the bobbin thread showed the example which uses a monochromatic thing, without dyeing, it is having constituted from drawing 11 so that ink jet dyeing's might be carried out like [a bobbin thread] a needle thread and automatic embroidery's could be performed, and enabled it to embroider [of a base fabric] various colors with said example.

[0032]

[Effect of the Invention] While carrying out ink jet dyeing of the needle thread according to embroidery pattern information according to this invention By considering as the configuration which carries out automatic embroidery, moving a base fabric according to embroidery pattern information after applying the ink jet technique and employing the three-dimensional power of expression of embroidery efficiently -- high -- it became possible to offer the ink jet dyeing automatic embroidery equipment which is excellent in operability and an embroidery rate considering a needle-thread change as fundamentally unnecessary, and can attain a brilliance color expression with a simple configuration.

[Translation done.]

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] The main configurations of the ink jet dyeing section of a needle thread in the ink jet dyeing automatic embroidery equipment of the 1st example of this invention and the embroidery section are shown.

[Drawing 2] the location where (A) does not lap with an embroidery pattern from a temporary embroidery starting position in the explanatory view which sets up identically the embroidery starting position and temporary embroidery starting position on a base fabric, and (B) -- the physical relationship with which these lap is shown.

[Drawing 3] It is the explanatory view of the example of a configuration of the ink jet dyeing section.

[Drawing 4] The modification of an ink jet head configuration which can be shade changed is shown.

[Drawing 5] Control-block drawing of the ink jet dyeing automatic embroidery equipment of this example is shown.

[Drawing 6] It is the explanatory view of the configuration modification of the ink jet dyeing section.

[Drawing 7] It is the example which constituted configuration deformation of the ink jet dyeing section, without making two ink jet heads counter thoroughly.

[Drawing 8] It is the explanatory view of the maintenance device of the recording head in this example.

[Drawing 9] It is the block diagram of the ink jet dyeing section used for the ink jet dyeing automatic embroidery equipment of the 2nd example of this example.

[Drawing 10] The example to which the core of a needle thread considered as the configuration which does not shift from the core of an ink jet head, and made the nozzle consistency of a core higher than a periphery in the modification of this example is shown.

[Drawing 11] It is ink jet dyeing automatic embroidery equipment constituted so that ink jet dyeing might be carried out like [a bobbin thread] a needle thread and automatic embroidery could be performed.

[Translation done.]

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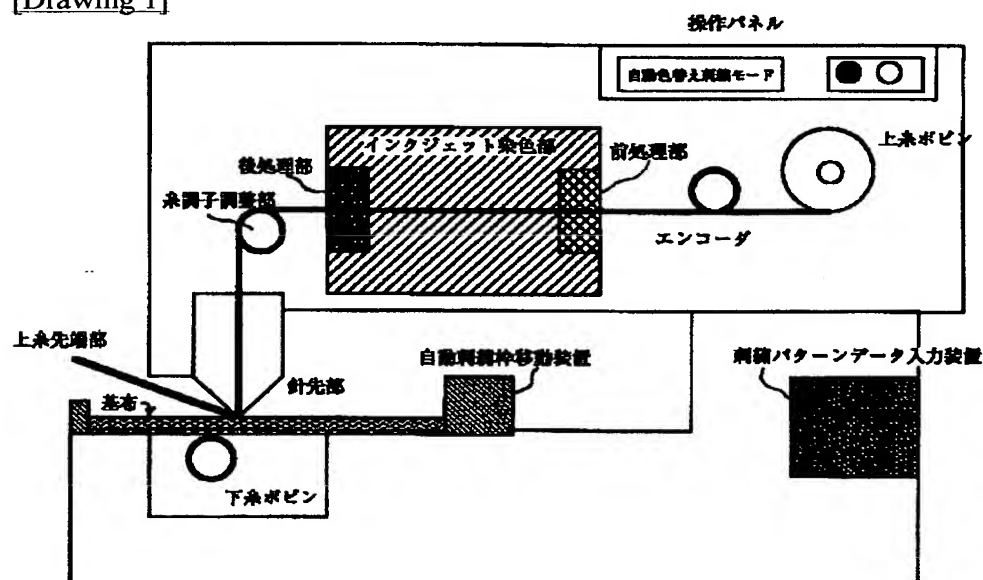
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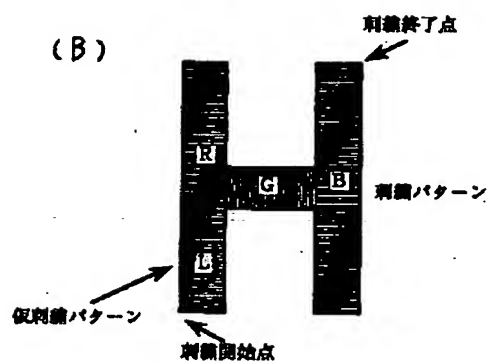
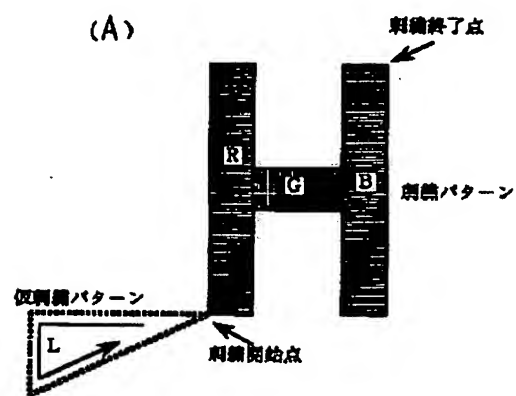
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DRAWINGS

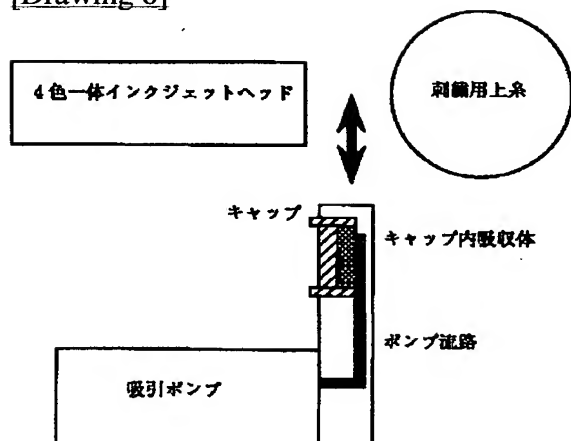
[Drawing 1]



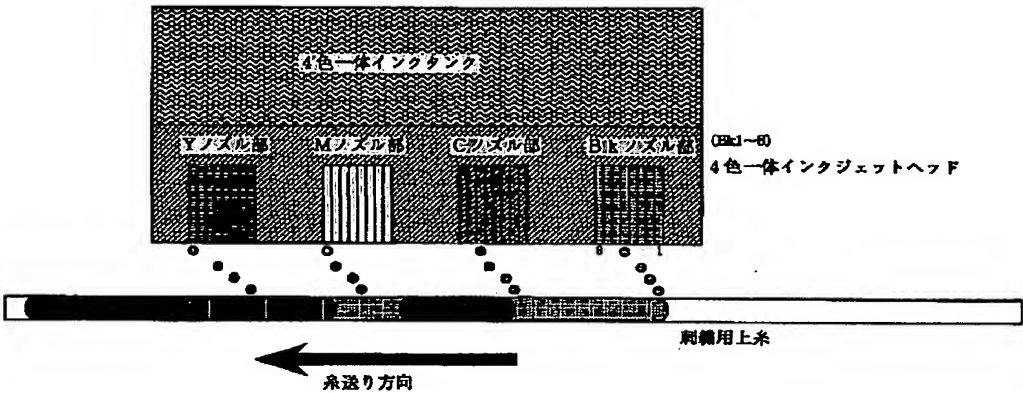
[Drawing 2]



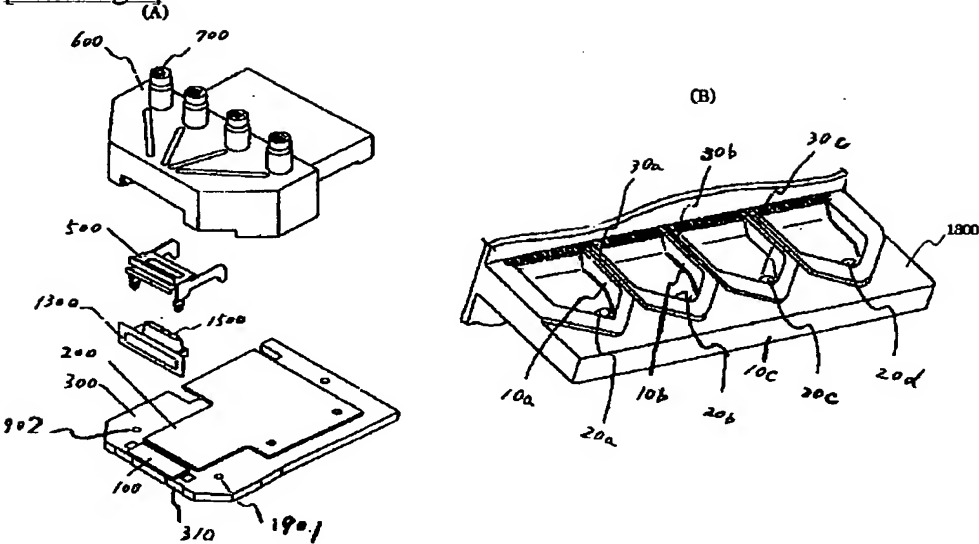
[Drawing 8]



[Drawing 3]



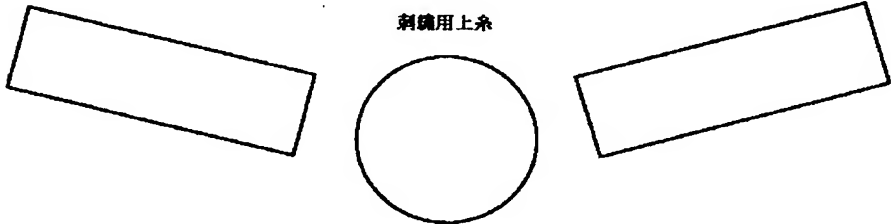
[Drawing 4]



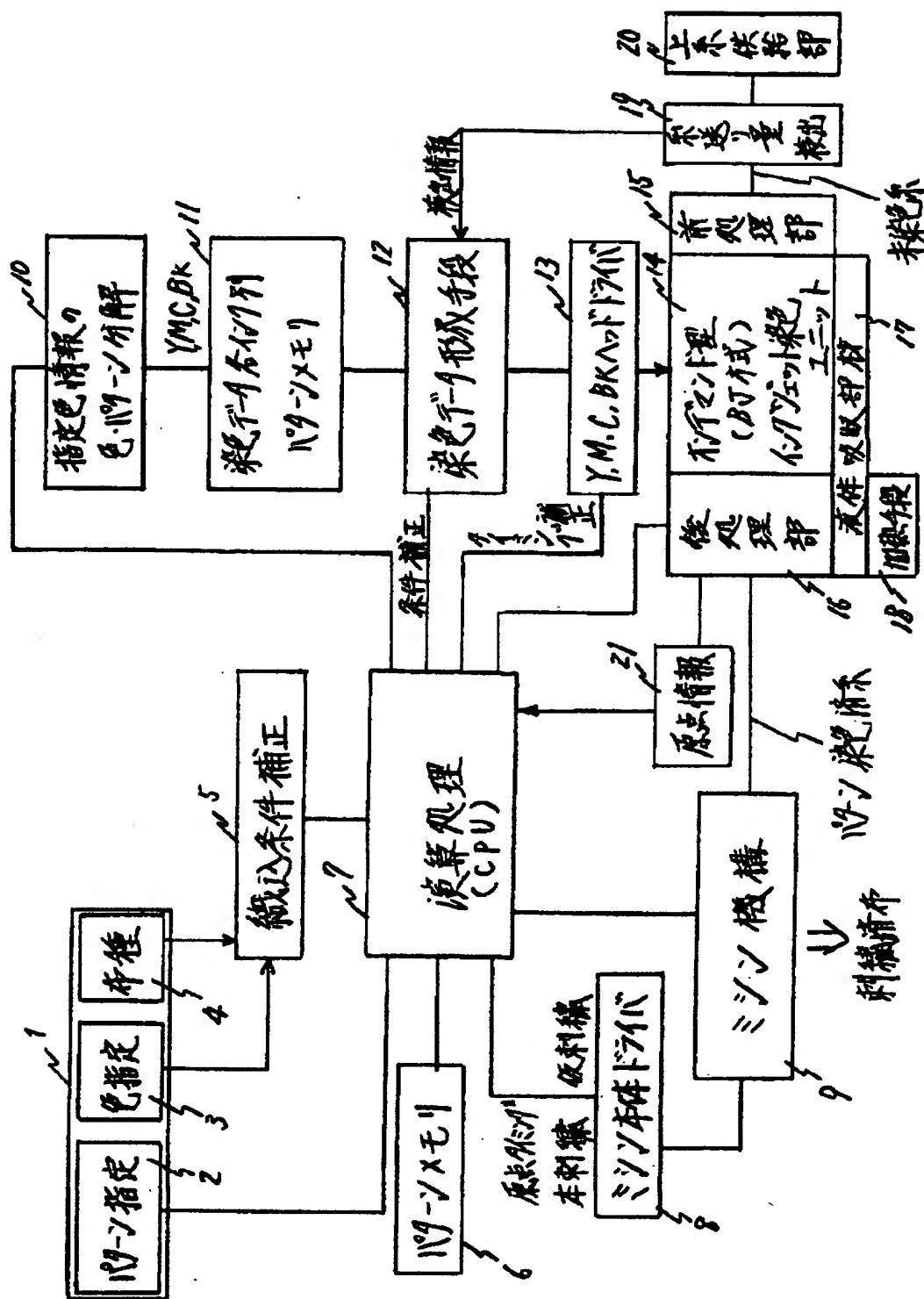
[Drawing 7]

4色一体インクジェットヘッド1

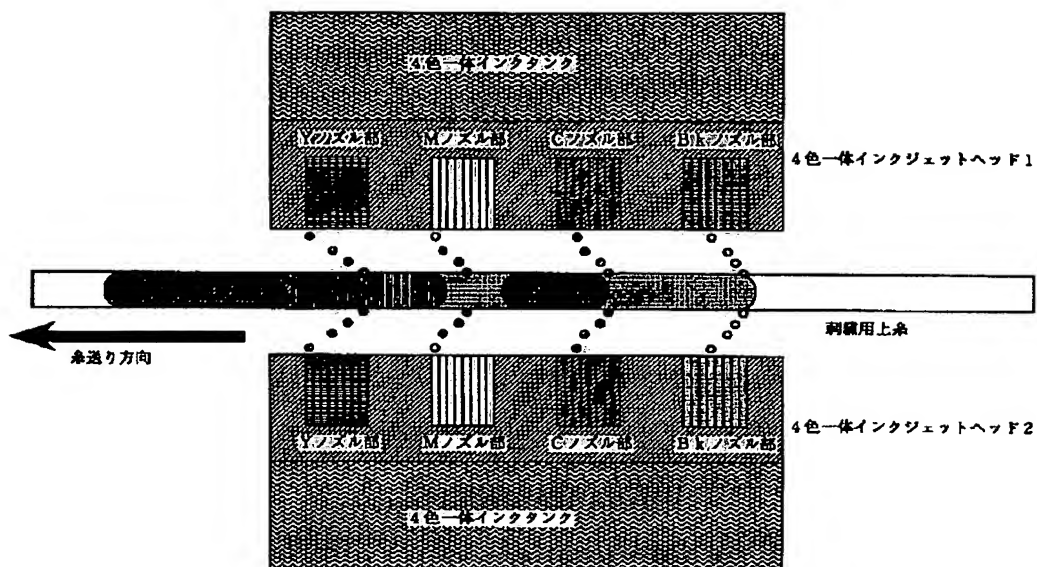
4色一体インクジェットヘッド2



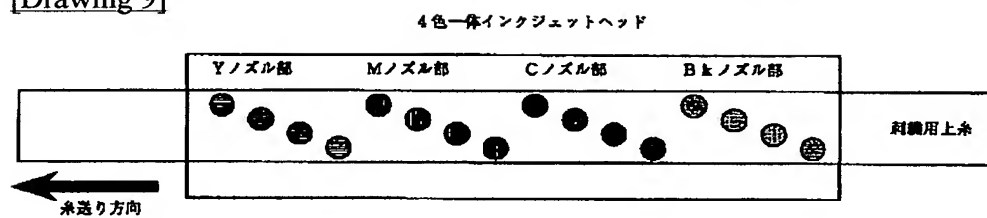
[Drawing 5]



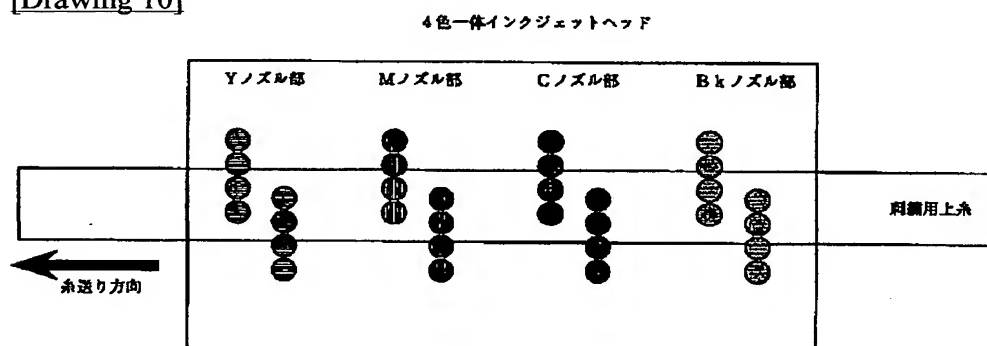
[Drawing 6]



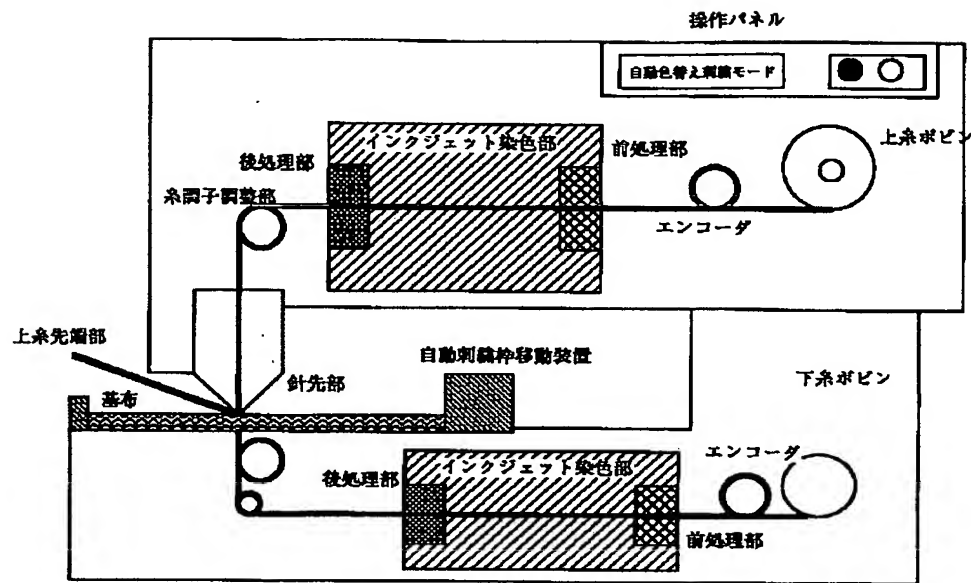
[Drawing 9]



[Drawing 10]



[Drawing 11]



[Translation done.]

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